

What Is Claimed Is:

1. A method for producing an electrocatalytic cathode for use in an electrochemical cell system comprising the steps of:

providing a carbon substrate; and

simultaneously depositing palladium and iridium on said carbon substrate by cyclic voltammetry.

2. The method according to claim 1 wherein said carbon substrate providing step comprises providing a high density carbon substrate.

3. The method according to claim 1 wherein said carbon substrate providing step comprises providing a carbon paper substrate.

4. The method according to claim 1 wherein said depositing step comprises depositing said palladium and iridium from a solution containing 1.0 mM  $\text{PdCl}_2$ , 2.0mM  $\text{Na}_2\text{IrCl}_6$ , 0.2M  $\text{KCl}$ , and 0.1M  $\text{HCl}$ .

5. The method according to claim 4 wherein said depositing step further comprises performing said cyclic voltammetry at a voltage in the range of +1.06V to -1.0V vs. a silver/silver chloride reference electrode at a scan rate in the range of from about 1.0 millivolt/sec to about 65 millivolt/sec for about 5 to 45 cycles.

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6. The method according to claim 4 wherein said depositing step further comprises performing said cyclic voltammetry at a voltage in the range of -0.150V to -0.300V vs. a silver/silver chloride reference electrode at a scan rate of 10 mV/s for 25 cycles.

7. A method for producing an electrocatalytic cathode for use in an electrochemical cell system comprising the steps of:

providing a carbon substrate; and

simultaneously depositing palladium and iridium on said carbon substrate by controlled potential coulometry.

8. The method according to claim 7 wherein said carbon substrate providing step comprises providing a high density carbon substrate.

9. The method according to claim 7 wherein said carbon substrate providing step comprises providing a carbon paper substrate.

10. The method according to claim 7 wherein said depositing step comprises depositing said palladium and iridium from a solution containing 1.0 mM  $\text{PdCl}_2$ , 2.0mM  $\text{Na}_2\text{IrCl}_6$ , 0.2M  $\text{KCl}$ , and 0.1M  $\text{HCl}$ .

11. The method according to claim 10 wherein said depositing step comprises carrying out said controlled potential coulometry

at a voltage of -0.25V vs. a silver/silver chloride reference electrode for 10 minutes.

12. The method according to claim 10 wherein said depositing step comprises carrying out said controlled potential coulometry at a potential between 1.0V to -1.0V vs. a silver/silver chloride reference electrode for a time in the range of from about 3 to 10 minutes.

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